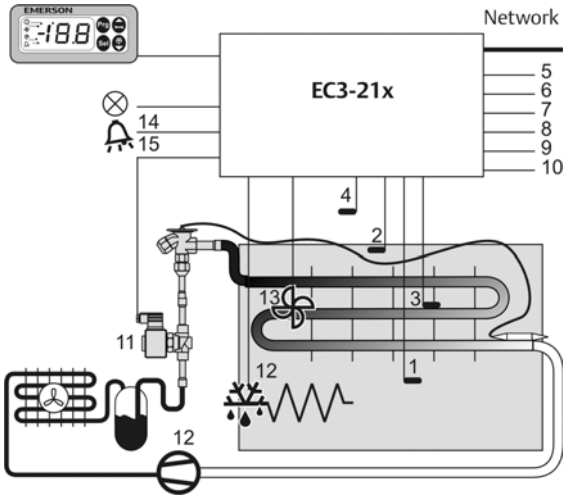
EC3-211 Coldroom Controller and ECD-001/-003 Display Unit

Operating Instructions

GB

Note: This document contains short form instructions for experienced users. Use last column in List of Parameters to document your individual settlings. More detailed information can be found in the User Manual.

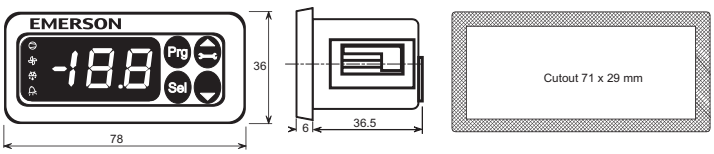
The **EC3-211** is a controller for refrigeration applications with thermostatic expansion valves, off cycle / forced defrosts and Lon communication.



The controller has four temperature inputs, three inputs for air in (1), air out (2) and defrost termination temperature (3) and one temperature input for room temperature (4).
There are six universal digital inputs available (5) … (10). The functionality of the digital input is user selectable. The six digital inputs can be used as inputs for one logic function block which can be configured to be AND, OR, NAND or NOR. The output of the logic function block can be used to drive one of the two relay outputs (14) (15).
The controller has five relay outputs, one for a solenoid valve (11), one for a defrost heater (12), one for fan control (13) and two universal outputs (14) (15). The function of the universal outputs is user selectable. The relay can be driven by a LON network variable, by the internal alarm, by the logic block or by one of the six digital inputs.
The optional temperature display ECD-003 can show values with a decimal point in the range between -19.9 and +19.9°C otherwise without decimal point.
The optional Display/Keypad Unit ECD-001 has the same functions as ECD-003. In addition it allows parameter modification with a 4-key pad.
The communication interface is Echelon LONWorks FTT10.
The supply voltage is 24 VAC. Transformers for 230V or 110V mains supply are available as options.

Safety instructions:

- **Read installation instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.**
- **The product is intended for use by persons having the appropriate knowledge and skills.**
- **Ensure electrical ratings per technical data are not exceeded.**
- **Disconnect all voltages from system before installation.**
- **Keep temperatures within nominal limits.**
- **Comply with local electrical regulations when wiring**



Technical Data

EC3 Series Controller

Power supply	24VAC -15% / +10%; 50/60Hz; Class II 6.3mm spade earth connector
Power consumption	12VA max.
Communication	LonWorks® Interface, FTT10
Plug-in connector size	Removable screw terminals wire size 0.5 … 1.5mm²
Ambient temperature range	Operating 0 … +50°C (32 … 122°F) Storage -10 … +70°C (14 … 158°F)
Humidity	0…80% r.h. non condensing
Protection class	IP20
Analog inputs	Air in temp., Air out temp., Defrost termination temp., Room temp.
Digital Inputs	24VAC/DC or 230VAC Configurable function
Sensor:	NTC (10K at 25°C)
Output relays (4)	SPDT contacts, AgNi, resistive (AC1) 250V/8A Inductive (AC15) 250V/2A Configurable function
⚠ If the alarm relay is not utilized, the user must ensure appropriate safety precautions are in place to protect the system against damage caused by a failure.	

ECD-001 Display Unit

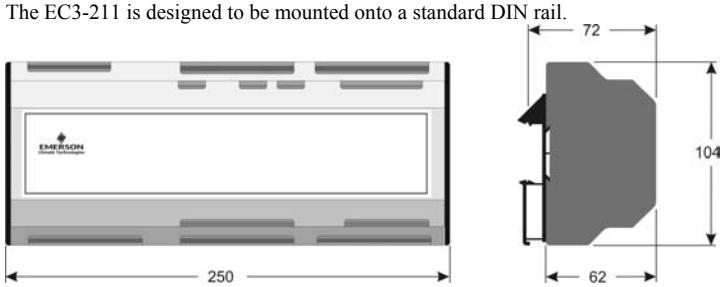
Power Supply	From EC3-211 via connecting cable
Display	2½-digit red LED with decimal point switchable between °C and °F
LED indicators	Compressor, Fan, Defrost, Alarm, IR active, Neuron ID
Temp & Humidity	Identical to EC3-211 specifications above
Protection class	IP65 (front protection with gasket)
Connecting cable	ECC-N10 (1,0m) or CAT5 cable with RJ45 connectors

ECD-003 Display Unit

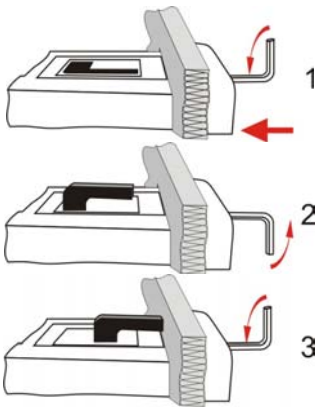
Power Supply	From EC3-211 via connecting cable
Display	2½-digit red LED with decimal point switchable between °C and °F
LED indicators	none
Temp & Humidity	Identical to EC3-211 specifications above
Protection class	IP65 (front protection with gasket)
Connecting cable	ECC-N10 (1,0m) or CAT5 cable with RJ45 connectors

Mounting

The EC3-211 is designed to be mounted onto a standard DIN rail.

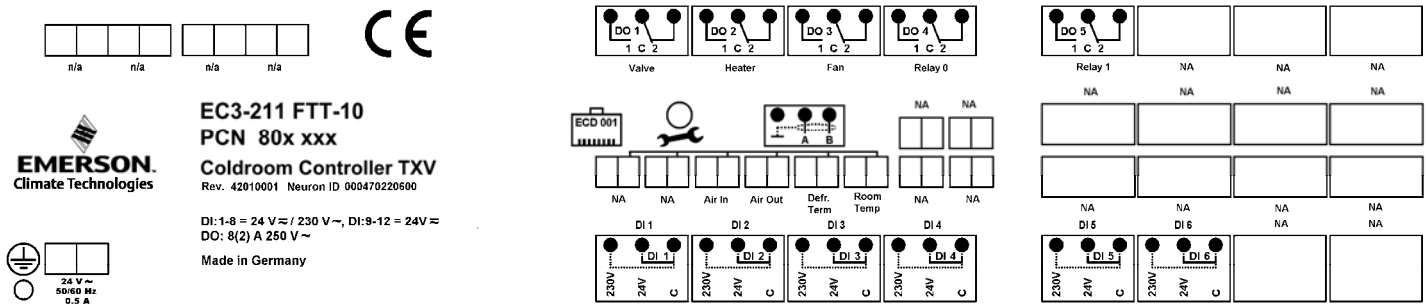


ECD-001/-003 can be mounted in panels with a 71 x 29 mm cutout. See dim. drawing below for space requirements including rear connectors.
Push controller into panel cutout.(1)
Make sure that mounting lugs are flush with outside of controller housing. Insert Allen key into front panel holes and turn clockwise. Mounting lugs will turn and gradually move towards panel (2)
Turn Allen key until mounting lug barely touches panel. Then move other mounting lug to the same position (3).
Tighten both sides very carefully until controller is secured. Do not over tighten as mounting lugs will break easily.



Electrical Installation

Refer to the electrical wiring diagram (below) for electrical connections. A copy of this diagram is labeled on the controller. Use connection wires/cables suitable for 90°C operation (EN 60730-1). Ground the metal housing with a 6.3mm spade connector.

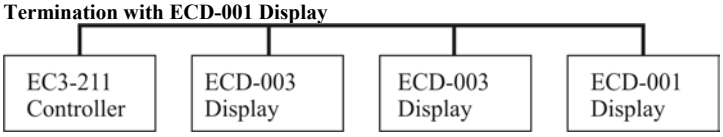


EC3 analog inputs are for dedicated sensors only and should not be connected to any other devices. Digital inputs should only be connected to the specified voltages, see wiring diagram. **Warning**: The EC3 will be permanently damaged, if the specified voltage at any of EC3 inputs is exceeded.

Important: Keep controller and sensor wiring well separated from mains wiring. Minimum recommended distance 30mm..

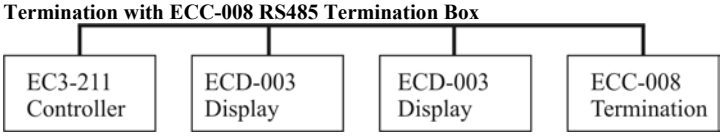
Warning: Use a class II category transformer for 24VAC power supply (EN 61558). Do not ground the 24VAC lines. We recommend to use one transformer per EC3 controller and to use separate transformers for 3rd party controllers, to avoid possible interference or grounding problems in the power supply.

Termination with ECD-001 Display



ECD-001 must be the last device on communication bus to terminate the bus correctly.

Termination with ECC-008 RS485 Termination Box



Recommended Sensor Positions for Cold Room Applications:

ECN-Sxx air in / out temperature sensor (2): Should be mounted on spacers in the middle of the air duct so that there is airflow around and positioned on the inlet / outlet of the evaporator as high as possible close to the ceiling.

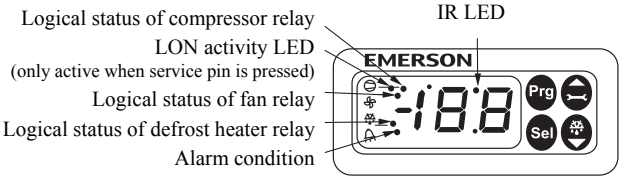
ECN-Fxx fin temperature sensor (3): Position on the evaporator, asymmetric closer to the expansion valve.

Display of Data:

The data to be shown on the display can be selected by the user. In case of an alarm, the alarm code is displayed alternately with the selected data. The user can inhibit the alarm code. Press the **SEL** button to scroll through all possible displayable data.

The display will show for one second the numerical identifier of the data and then the selected data. After two minutes the display will return to the data selected by parameter /1.

It is possible to temporarily display the values of the different sensors. This is a useful feature when initially setting-up the system without the aid of the WebPages. Press the **SEL** sequentially. The value displayed on the screen corresponds to the number corresponding to the /1 parameter. Action only valid when parameter H2 = 3.



Setup and Parameter Modification Using the Keypad of the ECD-001

For convenience, an infrared receiver for the optional **IR remote control unit** is build-in, enabling quick and easy modification of the system parameters when a computer interface is not available.

Alternatively, the parameters can be accessed via the 4-button keypad. The configuration parameters are protected by a numerical password. The default password is "12". To select the parameter configuration:

- Press the **PRG** button for more than 5 seconds, a flashing "0" is displayed
- Press ▲ or ▼ until the password is displayed (default = "12"), if password was changed select the new password
- Press **SEL** to confirm password

The first modifiable parameter code is displayed (/1).

To modify parameters see Parameters modification below.

Parameter Modification: Procedure

- Press ▲ or ▼ to show the code of the parameter that has to be changed;
- Press **SEL** to display the selected parameter value;
- Press ▲ or ▼ to increase or decrease the value;
- Press **SEL** to temporarily confirm the new value and display its code;
- Repeat the procedure from the beginning "*press* ▲ or ▼*to show...*"

To exit and save the new settings:

- Press **PRG** to confirm the new values and exit the parameters modification procedure.

To exit without modifying any parameter:

- Do not press any button for at least 60 seconds (TIME OUT).
- Press "**ESC**" on IR remote control.

Defrost Activation:

A defrost cycle can be activated locally from the keypad:

- Press the ▼ button for more than 5 seconds, a flashing "0" is displayed
- Press ▲ or ▼ until the password is displayed (default = "12"), if password was changed, select the new password
- Press **SEL** to confirm password

The defrost cycle is activated.

Special Functions:

The Special Functions can be activated by:

- Press ▲ and ▼ together for more than 5 seconds, a flashing "0" is displayed.
- Press ▲ or ▼ until the password is displayed (default = "12"). If password was changed, select the new password.
- Press **SEL** to confirm password
- A "0" is displayed and the Special Function mode is activated.
- Press ▲ or ▼ to select the function. The number of special functions is dynamic and controller dependent. See list below.
- Press **SEL** to activate the function without leaving the special function mode.
- Press **PRG** to activate the function and leave the special function mode.

Most of the Special Functions work in a toggle mode, the first call activates the function, and the second call deactivates the function.

The indication of the function can only be displayed after exiting the special function mode.

- 0: Display test function
- 1: Clear alarm messages
- 2: Cleaning mode. The cleaning mode is effectively a manual defrost with the option of the fans on/off. The cleaning mode should not be used in order to isolate the application for maintenance purposes.
- 3: Fans only
- 5: Resets all parameters to the factory default setting. The controller will indicate "oF" during the reset.

List of Parameters

		Min	Max	Unit	Def.	Custom
/	**DISPLAY PARAMETERS**					
/1	Value to show 0 = Thermostat control temperature; temp. alignment /C will only work with this temperature display 1 = Air in temperature 2 = Air out temperature 3 = Alarm temperature 4 = Defrost termination temperature 5 = Room temperature 6 = Displays defrost status	0	6	-	0	
/2	Alarm suppression 0 = off, 1 = on	0	1	-	0	
/5	Temperature Unit 0 = °C, 1 = °F	0	1	-	0	
/6	Decimal point 0 = yes, 1 = no	0	1	-	0	
/7	ECD display during defrost 0 = dF (= defrost mode); 1 = dF + defrost termination temp. 2 = dF + control temperature	0	2	-	0	
/C	Temperature alignment for /1=0	-20	20	K	0.0	
A	**ALARM PARAMETERS**					
A0	Mean factor alarm temperature	0	100	%	100	
A1	Low temp alarm delay	0	180	min	5	
A2	High temp alarm delay	0	180	min	5	
A3	Alarm delay after defrost	0	180	min	10	
Ad	Door alarm delay	0	180	min	2	
AH	High temp alarm limit	AL	70	°C / K	40	
AL	Low temp alarm limit	-50	AH	°C / K	-50	
At	Alarm limit type 0=absolute temperatures °C; 1= relative temperatures K to setpoint	0	1	-	0	
r	**THERMOSTAT PARAMETERS**					
r0	Door contact function (see page 4)	0	15	-	6	
r1	Min. setpoint	-40	r2	°C	-40	
r2	Setpoint max.	r1	60	°C	40	
r3	Day/night control 0 = off, 1 = on	0	1	-	1	
r4	Thermostat mode 0 = off, no thermostat function, continues cooling, air in sensor monitoring off, no temp. alarms generated 1 = cooling, deadband control cut in = set-point + difference / cut out = set-point 2 = cooling, modulating thermostat cut in = set-point / cut out = set-point – difference /2 3 = heating, deadband control cut in = set-point – difference / cut out = set-point 4 = on, external control using nviValve; Air sensor monitoring off. Temperature alarms will be generated	0	4	-	1	
r6	Setpoint night	r1	r2	°C	4.0	
r7	Differential night	0.1	20	K	2.0	
r8	Mean factor day operation	0	100	%	100	
r9	Mean factor night operation	0	100	%	50	
rd	Differential day	0.1	20	K	2.0	
St	Setpoint day	r1	r2	°C	2.0	
d	**DEFROST PARAMETERS**					
d0	Defrost mode 0 = natural defrost, defrost heater not activated; pulsed defrost not possible 1 = forced defrost, defrost heater activated, pulsed defrost possible 2 = forced defrost, defrost heater activated, pulsed defrost possible, defrost termination using nviStartUp	0	2	-	1	
d1	Termination by: 0 = termination by temperature, termination by time will generate an alarm 1 = termination by time, termination by temperature will generate an alarm 2 = first, what ever comes first time or temperature, no alarm 3 = last, by time and temperature, no alarm Caution: can generate indefinite defrost periods	0	3	-	0	
d2	Defrost sensor used 0 = yes, 1 = no; defrost termination with air out sensor	0	1	-	0	
d3	Pulsed defrost 0 = off, no pulsed defrost, heaters switched off at defrost termination temperature dt or max. time dP whatever is selected 1 = on, pulsed defrost, dd and dH in use, heaters are switched off at dH and switched on again at dH – dd	0	1	-	0	
d4	Defrost at startup 0 = no, 1 = yes	0	1	-	0	
d5	Delay power up defrost	0	180	min	0	
d6	Pump down delay Compressor will run during pump down delay while valve is closed	0	180	sec	0	
d7	Drain delay	0	180	min	2	
d8	Injection delay Valve is open during injection delay while compressor is not running	0	180	sec	0	
d9	Demand defrost mode 0 = demand defrost off; 1 = on; 2 = on + defrost if no demand defrost within dI	0	2	-	0	
dd	Pulsed defrost differential	1	20	K	2	
dH	Pulsed defrost setpoint	-40	dt	°C	5	
dt	Defrost termination temperature	-40	90	°C	8	
dP	Max. defrost duration	0	180	min	30	
dI	Defrost interval	0	192	h	8	
dU	Start up delay after synch	0	180	min	30	
F	**FAN PARAMETERS**					
F1	Fan startup after defrost by: 0 = on 1 = delayed by time Fd, error on temperature 2 = by temperature Ft, error on time 3 = first, whatever comes first: time or temperature, no alarm 4 = last, time and temperature must come, no alarm	0	4	-	0	
F2	Fan during no cooling 0 = on; 1 = off; 2 = delayed by F4; 3 = off, when door open	0	2	-	0	
F3	Fan during defrost 0 = on, 1 = off	0	1	-	0	
F4	Stop delay time	0	30	min	0	
F5	Fan during cleaning 0 = off, 1 = on	0	1	-	0	
Fd	Fan delay after defrost	0	30	min	0	
Ft	On temp after defrost	- 40	+ 40	°C	0	
	DIGITAL INPUT PARAMETERS					
i0	Input logic digital input #1 1 = reversed logic	0	1	-	0	
m0	Function digital input #1 0 = no function 1 = cleaning 2 = fan only 3 = door contact 4 = continuous cooling 5 = day / night switch 6 = no function 7 = defrost request 8 = defrost inhibit	0	8	-	0	
i1	Input logic digital input #2	0	1	-	0	
m1	Function digital input #2	0	8	-	0	
i2	Input logic digital input #3	0	1	-	0	
m2	Function digital input #3	0	8	-	0	
i3	Input logic digital input #4	0	1	-	0	
m3	Function digital input #4	0	8	-	0	
i4	Input logic digital input #5	0	1	-	0	
m4	Function digital input #5	0	8	-	0	
i5	Input logic digital input #6	0	1	-	0	
m5	Function digital input #6	0	8	-	0	
IL	**LOGIC BLOCK PARAMETERS**					
IL0	Digital input #1: 0 = off; 1 = active	0	1	-	1	
IL1	Digital input #2: 0 = off; 1 = active	0	1	-	1	
IL2	Digital input #3: 0 = off; 1 = active	0	1	-	1	
IL3	Digital input #4: 0 = off; 1 = active	0	1	-	1	
IL4	Digital input #5: 0 = off; 1 = active	0	1	-	1	
IL5	Digital input #6: 0 = off; 1 = active	0	1	-	1	
ILL	Logic 0 = AND; 1 = OR	0	1	-	0	
ILI	Output inverter: 0 = off; 1 = on	0	1	-	0	
ld	**LOGIC BLOCK DELAY PARAMETERS**					
ld0	Delay digital input #1 0 = no delay; >0 = On signal delayed; <0 = Off signal delayed	-199	199	10sec	0	
ld1	Delay digital input #2	-199	199	10sec	0	
ld2	Delay digital input #3	-199	199	10sec	0	
ld3	Delay digital input #4	-199	199	10sec	0	
ld4	Delay digital input #5	-199	199	10sec	0	
	DIGITAL OUTPUT PARAMETERS					
o0	Logic output relay #0 0 = normal logic; 1 = reverse logic	0	1	-	0	
n0	Source output relay #0 0 = network variable nviDO(x); 1 = Controller alarm 2 = Output logic block; 3 = Digital input #1 4 = Digital input #2; 5 = Digital input #3 6 = Digital input #4 7 = Digital input #5 8 = Digital input #6	0	8	-	0	
o1	Logic output relay #1 0 = normal logic; 1 = reverse logic	0	1	-	1	
n1	Source output relay #1 (see parameter list n0)	0	8	-	0	
H	**OTHER PARAMETERS**					
H2	Display access 0 = all disabled (Caution: access to controller only via the LON network) 1 = Keyboard enabled; 2 = IR remote control enabled 3 = Keyboard and IR remote control enabled	0	3	-	3	
H3	IR access code	0	199	-	0	
H5	Password	0	199	-	12	

Remarks:

r0 Door contact function

r0	Cooling	Temp. alarm	Function after delay time Ad
0 = 8	on	on	
1 = 9	off	on	
2 = 10	on	off	
3 = 11	off	off	
4 = 12	on	on	door alarm
5	off	on	door alarm
6 = 14	on	off	door alarm and temperature alarm on
7	off	off	door alarm and temperature alarm on
13	off	on	door alarm and cooling on
15	off	off	door alarm and cooling on and temperature alarm on

Mean factor calculation (Parameters A0, r8, r9)

Mean temperature calculation is performed by following formula

Temperature = Air in – ((Air in – Air out) * Mean factor / 100 .

Mean factor = 0 , Temperature = Air in
Mean factor = 100, Temperature = Air out

Alarm Codes

E2 **Air in sensor alarm**
E3 **Air out sensor alarm**
E4 **Defrost termination sensor (Fin sensor) alarm**
E5 **Room temp. sensor failure**
No sensor connected or
sensor and/or the sensor cable is broken or short-circuited.
Er **Data error display - out of range**
Data send to the display is out of range.
Ad **Door open alarm**
AH **High temperature alarm**
AL **Low temperature alarm**
Air in and air out sensor failure
dt **Forced defrost termination (time or temperature)**
Ft **Forced fan startup (time or temperature)**

Messages

--- **No data to display**
The display will show an "---" at node start up and when no data is send to the display.
In **Reset to default values activated**
The display will show an "In" when the factory default configuration data set is initialized.
Id **Wink request received**
The display will show a flashing "Id" when the wink request was received. The flashing "Id" will be shown on the display until the service button will be pressed, or a 30 min delay timer will expire or a second wink request is received.
OF **Node is offline**
The node is offline and no application is running. This is the result of a network management command and will happen for example during node installation.
oF **Digital input status**
on **Digital input status**
Indication of the digital inputs, oF = switch open, on = switch closed
dS **Defrost standby**
dP **Defrost Pump down**
dF **Defrost cycle**
dd **Defrost drain delay**
dI **Defrost injection delay**
du **Defrost start-up delay**
Cn **Cleaning**
CL **Alarms are cleared**

Visualising Data: LON Monitoring Server

The **EC3-211** has a LON communication interface enabling the controller to be directly connected to a Monitoring Server. It can be connected by using one of the optional cable assemblies to a LON network (e.g. ECC-011, order nr. 804 512, with RJ45 to RJ45 connectors and 6m length, or ECC-014, order nr. 804 381, with RJ45 to open, cable length 3m).

Neuron ID / Service PIN:

The service pin is available on the ECD display and on the controller. It is used to identify the controller in a LON network.

1. ECD display (ECD-001 only): Press the button for approx. 1 sec. to send the Neuron ID. The LED in the left upper corner will indicate the transmission of the Neuron ID.
2. Controller: There is a small hole left of the network connector. Use a small pen or screwdriver to press the switch behind the hole. An LED close to the switch will light to indicate the transmission of the Neuron ID.

Load Default Parameters:

Use a small pen or screwdriver to press the service pin switch on the controller. Keep it depressed while power is switched on. EC3 211 will be reset to default parameters.

The default settings may be modified remotely from the EMS Monitoring Server via the LON network. Consult the EMS user manual for more information.
It is also possible to display live graphical data on the server or to log data containing the control temperature at defined intervals.

Emerson Electric GmbH & Co OHG - Postfach 1251 - Heerstraße 111 - D-71332 Waiblingen - Germany - Phone .49-(0)7151-509-0 - Fax .49-(0)7151-509-200
www.emersonclimate.eu